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<b>TRANSMITTAL FORM</b>  (to be used for all correspondence after initial filing)	Application Number	10/613,735	
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	First Named Inventor	Rising, Larry	
	Art Unit	1762	
	Examiner Name	Bareford, Katherine	
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/613,735

Confirmation No. 5646

Applicant : Larry Rising

Filed : 07/03/2003

10 TC/A.U. : 1762

Examiner : Bareford, Katherine A

Docket No. : SSR001

Customer No. : 28848

20 For: "APPARATUS AND METHOD FOR APPLYING CHEMICALS TO  
SUBSTRATES VIA THE USE OF NONAQUEOUS SOLVENTS"

## BRIEF ON APPEAL

25 Hon. Commissioner for Patents  
Washington, D.C. 20231

Sir:

This is an appeal from the Final Rejection, dated July 22, 2005, for the above-identified patent application. The Appeal Brief was originally filed on February 28, 2006. A Notification of Non-Compliant Appeal Brief was mailed on October 2, 2006, stating that an Evidence Appendix and Related Proceeding Appendix should be included with this Appeal Brief. This Appeal Brief has been amended to comply with the Notification, including providing an Evidence Appendix and Related Proceeding Appendix. Thus, the Appellant respectfully requests that the Examiner accept this Appeal Brief.

### REAL PARTY IN INTEREST

The present application is not currently assigned. Thus, the real party in interest is Larry Rising.

### RELATED APPEALS AND INFERENCES

The Appellant is unaware of any other appeals or interferences related to the subject matter of this appeal.

### STATUS OF CLAIMS

Claims 1-74 are pending in the Application. Of those, Claims 1-23 and 49-74 were withdrawn from consideration. Claims 24 and 25 were cancelled. The remaining claims, Claims 26-48, are under Final Rejection as a result of the Office Action dated July 22, 2005. The Appellant appeals from the rejection of Claim 26. Further, the Appellant submits that the remaining claims, Claims 27-48 are patentable at least through their dependence upon an allowable base claim. The appealed claims are reproduced in the Claims Appendix

### STATUS OF AMENDMENTS

No claims have been amended subsequent to the final rejection.

### SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to an apparatus and method for applying chemicals to substrates through a continuous process and, more specifically, to a machine using non-aqueous solvents as a carrier medium for the chemicals, with the non-aqueous solvents being evaporated away and leaving the chemicals on the substrates, and with the non-aqueous solvents thereafter continuously condensed, purified, and recycled through the machine while the process runs. (*See* Specification, page 1, lines 11-15).

FIG. 3 illustrates acts performed in applying a chemical solution to a substrate.

The method comprises an act of forming a chemical mixture 300 comprising a non-aqueous solvent and a chemical solute, as is claimed in Claim 26. Non-limiting examples

of which include mixing the non-aqueous solvent and chemical solution separately, and thereafter introducing the chemical mixture to an application apparatus 106; forming the chemical mixture in a mix tank 107 and thereafter introducing the chemical mixture 107 to the application apparatus 106; or pumping the chemical mixture directly from a  
5 recovery tank 108 to the application apparatus 106. (See Specification, page 14, lines 1-7).

The method further comprises an act of applying the chemical mixture to the substrate 302, forming a wet substrate, a non-limiting example of which includes using  
10 an application apparatus 106, as is claimed in Claim 26. The application apparatus 106 is an item selected from a group consisting of a foam applicator, spray applicator, and a padding applicator, as is claimed in Claim 39. Additionally, the chemical mixture may be applied to an additional side of the substrate through use of an additional application apparatus 113, as is claimed in Claim 48. (See Specification, page 14, lines 9-14).

15

Furthermore, the method comprises an act of removing the non-aqueous solvent from the wet substrate 304, leaving a substrate with remaining chemical solution, as is claimed in Claim 26. Additionally, the method includes acts of removing a portion of the chemical mixture from the wet substrate, leaving a substrate with remaining chemical  
20 mixture; lowering a boiling point of the non-aqueous solvent in the substrate with remaining chemical mixture; and evaporating the non-aqueous solvent into a solvent vapor, as is claimed in Claim 26. (See Specification, page 14, lines 16-21).

The act of removing a portion of the chemical mixture from the substrate may be  
25 accomplished through use of a removal apparatus 109, a non-limiting example of which includes a squeeze roller, as is claimed in Claims 27 and 40. The act of lowering a boiling point of the non-aqueous solvent may be accomplished through use of a vacuum chamber 110, thereby decreasing the pressure and lowering the boiling point of the non-aqueous solvent. Furthermore, the act of evaporating the non-aqueous solvent into a  
30 solvent vapor may be accomplished through use of an evaporator apparatus 112, a non-limiting example of which includes a heat-exchanger or, in another aspect, a steam-based

heat exchanger, as is claimed in Claims 28, 29, 41, and 42. (*See* Specification, page 14, lines 23-30).

5 In addition, the method comprises the acts of preventing vapors from escaping by creating a negative pressure; and removing remaining solvent vapors **306**, as is claimed in Claim 30. The act of preventing vapors from escaping by creating a negative pressure may be achieved through the use of any suitable apparatus for displacing air, a non-limiting example of which includes a blower apparatus **200**, as is claimed in Claims 31 and 43. For example, the blower apparatus **200** may take the form of a blower, or a fan,  
10 as is claimed in Claim 31. Additionally, the act of removing remaining solvent vapors may be accomplished through the use of a separator **216**, a non-limiting example of which includes a separator **216** comprising a mist eliminator and high efficiency separator, as is claimed in Claims 32 and 44. (*See* Specification, page 15, lines 1-10).

15 Furthermore, the method comprises an act of collecting any removed non-aqueous solvent **308**, as is claimed in Claim 33. A non-limiting example of collecting any removed non-aqueous solvent **308**, comprises acts of pushing the solvent vapor into a vapor scrubber chamber **202** via a negative pressure difference between the vapor scrubber chamber **202** and surrounding areas; condensing the solvent vapor into a  
20 condensed liquid solvent solution; collecting the condensed liquid solvent solution and the portion of the chemical mixture into a collected solution **211**; heating the collected solution **211** to vaporize the non-aqueous solvent into a re-vaporized non-aqueous solvent; cooling and condensing the re-vaporized non-aqueous solvent into a re-condensed non-aqueous solvent; and collecting the re-condensed non-aqueous solvent, as  
25 is claimed in Claim 34. (*See* Specification, page 15, lines 12-21).

The act of pushing the solvent vapor into vapor scrubber chamber **202** may be accomplished through use of a blower apparatus **200**, non-limiting examples of which include a blower or a fan. Additionally, the act of condensing the solvent vapor into a  
30 condensed liquid solvent solution may be achieved through use of a condensing apparatus **204**, a non-limiting example of which includes a water spray mechanism, as is claimed in

Claim 35. In addition, the act of collecting the condensed liquid solvent solution and the portion of the chemical mixture into a collected solution 211, and the act of heating the collected solution 211 to vaporize the non-aqueous solvent into a re-vaporized non-aqueous solvent, may be accomplished using a re-boiler tank 206, as is claimed in Claims 36 and 45. Furthermore, the act of cooling and condensing the re-vaporized non-aqueous solvent into a re-condensed non-aqueous solvent, may be achieved through use of a cooling chamber 208, a non-limiting example of which includes using cooling pipes. (See Specification, page 15, line 12, through page 16, line 4).

Additionally, the act of collecting the re-condensed non-aqueous solvent may be accomplished through use of any suitable means for collecting a liquid solution, a non-limiting example of which includes use of a recovery tank 108. Once in the recovery tank 108, there is a small amount of water that condenses with the non-aqueous solvent. The small amount of water may be readily separated from the non-aqueous solvent due to differences in specific gravity and then further decanted away and out of the machine 100. After decanting away the small amount of water, the re-condensed non-aqueous solvent is substantially pure and may be recycled through the machine 100. Through the use of a pump 212, the re-condensed non-aqueous solvent may be pumped from the recovery tank 108 to a mix tank 107, where it is combined with appropriate chemicals to create the chemical mixture, as is claimed in Claims 37 and 46. The chemical mixture may then be pumped to the application apparatus 106, and optionally to the additional application apparatus 113, where it is applied to a new substrate, as is claimed in Claims 38 and 47. Or in the alternative, the re-condensed non-aqueous solvent may be pumped directly from the recovery tank 108 to the application apparatus 106, and optionally to the additional application apparatus 113. (See Specification, page 15, lines 6-20).

### GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Issue 1 – Are Claims 26-48 patentable under 35 U.S.C. § 112, first paragraph, as complying with the written description requirement?



Issue 2 – Are Claims 26-30 and 33 patentable under 35 U.S.C. § 102(b) over U.S. Patent No. Re 27,995, to Wedler (hereinafter referred to as “the Wedler patent”)?

Issue 3 – Is Claim 31 patentable under 35 U.S.C. 103(a) over the Wedler patent as applied to Claims 26-30 and 33, in further view of U.S. Patent No. 4,136,636, to Ellison  
5 et al. (hereinafter referred to as “the Ellison patent”)?

Issue 4 – Are Claims 32 and 34-42 patentable under 35 U.S.C. 103(a) over the Wedler patent as applied to Claims 26-30 and 33, in further view of U.S. Patent No. 4,421,794, to Kinsley, Jr. (hereinafter referred to as “the Kinsley patent”)?

Issue 5 – Are Claims 43-48 patentable under 35 U.S.C. 103(a) over the Wedler  
10 patent in view of the Kinsley patent as applied to Claims 32 and 34-42, in further view of the Ellison patent?

### THE ARGUMENT

*Issue 1 – Are Claims 26-48 patentable under 35 U.S.C. § 112, first paragraph, as complying with the written description requirement?*

15 In section 6 of the Office Action of July 22, 2005, the Examiner rejected Claims 26-48 as being unpatentable under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The Appellant submits that the Examiner misinterpreted the specification and that Claims 26-48 comply with the requirements of 35 U.S.C. § 112. Please note that the claims listed below are not in numerical order, but  
20 rather are in an order corresponding to the Examiner’s Final Rejection.

#### Claim 26

Regarding Claim 26, the Examiner stated that the claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had  
25 possession of the claimed invention.

Independent Claim 26 was amended by the June 13, 2005 amendment to require “passing the substrate with remaining chemical mixture by and against an evaporator apparatus, such that the evaporator apparatus operates as a heat plate to evaporate the non-aqueous solvent into a solvent vapor.” The Examiner stated that this is new matter,  
5 claiming that the figures as provided do not indicate that the evaporator is a heat plate that contacts the substrate. The Examiner further stated that the description in the specification at page 11 does not indicate the use of a heat plate that contacts the substrate.

10 The Examiner misinterpreted the specification. The applicable portion of the specification states,

“After interacting with the removal apparatus 109, the substrate with remaining chemical mixture then enters a vacuum chamber 110, where negative pressure lowers a boiling point of the non-aqueous solvent. In the vacuum chamber 110,  
15 the substrate with remaining chemical mixture interacts with an evaporator apparatus 112. The evaporator apparatus 112 is used to evaporate the non-aqueous solvent into a solvent vapor, thereby removing the non-aqueous solvent from the substrate 104. The evaporator apparatus 112 may be any suitable apparatus for evaporating the non-aqueous solvent. For example, the evaporator apparatus 112 may be a heat exchanger. Further, the heat exchanger may be a steam-based heat exchanger, where steam is passed through the heat exchanger, providing a sufficient amount of heat to evaporate the non-aqueous solvent. After having come in contact with the evaporator apparatus 112, the substrate 104 then leaves the vacuum chamber 110 and subsequently leaves the machine 100  
20 altogether, with the chemical solution remaining and the non-aqueous solvent removed.” (See page 11, lines 10-22).

As defined by the American Heritage Dictionary, a heat exchanger is “a device, such as an automobile radiator, used to transfer heat from a fluid on one side of a barrier to a  
30 fluid on the other side without bringing the fluids into direct contact.” (See The American Heritage Dictionary of the English Language, Fourth Edition, Copyright 2000,



1995 by Houghton Mifflin Company). As applied to the present invention, the evaporator apparatus is a heat exchanger that is heated to transfer heat from a fluid on one side of a barrier to a cooler fluid on the other side of the barrier, without bring the fluids in to direct contact. In this case, the cooler fluid on the other side of barrier is the non-  
5 aqueous solvent that is disposed within the substrate. In operation, the substrate comes “in contact with the [heat exchanger and] then leaves the...machine altogether, with the ...non-aqueous solvent [evaporated].” (See page 11, lines 19-22). As clearly shown in FIG. 1, the substrate 104 passes through a series of rollers 109 and is thereafter passed by and against a surface (i.e., the barrier of the evaporator apparatus 112) before leaving the  
10 machine 100 altogether. As shown in FIG. 1 and described in the Specification, the heat exchanger 112 has a surface that the substrate passes against (i.e., “contact”). Given the description in the Specification in conjunction with elements 104 and 112 of FIG. 1, one skilled in the art would clearly understand the evaporator apparatus 112 to operate as a heated surface (i.e., heat plate) that when in contact with the substrate 104, operates to  
15 evaporate the non-aqueous solvent into a solvent vapor. Additionally, because a “heat plate” is a commonly known heat exchanger, one skilled in the art would understand the heated surface to be a “heat plate.”

Therefore, as described above, Claims 26-48 are patentable under 35 U.S.C. §  
20 112, first paragraph, as clearly complying with the written description requirement. Thus, the Applicant respectfully requests that the Board withdraw the Examiner’s rejection of Claims 26-48 under 35 U.S.C. § 112, first paragraph.

*Issue 2 – Are Claims 26-30 and 33 patentable under 35 U.S.C. § 102(b) over the Wedler patent?*

25 The Appellant submits that for the claims rejected under 35 USC 102(b), the Examiner reached an improper conclusion as to the teachings of the Wedler patent, and that the Wedler patent does not teach each of the claimed limitations of Claims 26-30 and 33. In order to establish a *prima facie* case of anticipation, the Examiner must set forth an argument that provides (1) a single reference (2) that teaches or enables (3) each of the  
30 claimed elements (as arranged in the claim) (4) either expressly or inherently and [(5) as

interpreted by one of ordinary skill in the art]. *See* Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987). All of these factors must be present, or a case of anticipation is not met. Thus, “[a]nticipation requires the disclosure in a single prior art reference of each element of the claim under consideration.” *See* W.L. Gore & Associates v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983).

#### Claim 26

Regarding Claim 26, the Examiner stated that the Wedler patent teaches a method of applying a chemical solution to a textile substrate. (*See* FIG. 3 and column 1, lines 15-30). The Examiner also stated that the Wedler patent discloses the formation of a chemical mixture that comprises a non-aqueous solvent and a chemical solute. (*See* column 1, lines 15-30, column 3, lines 25-35, and column 4, lines 10-20). The Examiner further stated that the Wedler patent teaches chemical mixture being applied to the substrate to form a wet substrate. (*See* FIGs. 1 and 3 and column 4, lines 10-20 and 65-75). Additionally, the Examiner stated that Wedler patent discloses the solvent being removed from the wet substrate leaving a substrate with remaining chemical solute. (*See* FIGs. 1 and 3 and column 4, lines 65-75 (i.e., the padding rolls 14)). The Examiner further stated the removal of the solvent from the substrate can comprise removing a portion of the chemical mixture from the wet substrate, leaving a substrate with remaining chemical mixture. (*See* FIGs. 1 and 3 and column 4, lines 65-75 (i.e., the padding rolls 14)). The Examiner also stated that the boiling point of the solvent in the substrate with remaining chemical mixture can be lowered. (*See* FIG. 3, column 4, lines 65-75 and column 3, lines 1-15 (a vacuum is provided in the chamber 12 and 12', which would inherently lower the boiling point)). The Examiner further stated that a solvent can be evaporated into solvent vapor by passing the substrate with remaining chemical mixture by and against an evaporator apparatus. (*See* FIG. 3 and column 5, lines 5-25 (i.e., the cylinders 44)). The Examiner concluded by stating that the Wedler patent teaches evaporator apparatus that can act as a heat plate to evaporate the solvent into solvent vapor. (*See* FIG. 3 and column 5, lines 5-25 (i.e., the cylinders 44 are heated and act to vaporize the solvent and dry the web)).

The Examiner misinterpreted the Wedler patent, as it discloses heated rollers and not a heat plate. The Wedler patent discloses a textile material that is fed in a series over a plurality of rollers to heat the textile. (See the Wedler patent, column 5, lines 6-7).

5 The upper rollers are cylinders 44 that are hollow and arranged to receive steam or hot water within the rollers for the purpose of heating the rollers. (See the Wedler patent, column 5, lines 7-10).

10 The cylinders described in the Wedler patent are heat exchanging rollers that allow the textile material to pass with and against the rollers. As applicable to the Wedler patent, “with” is defined as “in the same direction as.” (See The American Heritage Dictionary of the English Language, Fourth Edition, Copyright 2000 by Houghton Mifflin Company). In other words, the cylinders operate to allow the textile material to roll past the rollers in the same direction as the rollers roll.

15 The Wedler patent is to be contrasted with the device of the Claim 26, where the heat exchanger is a fixed device that operates as a heat plate to allow a textile material to pass by and against the heat exchanger to evaporate the non-aqueous solvent (i.e., “...evaporating the non-aqueous solvent into a solvent vapor by passing the substrate with remaining chemical mixture by and against an evaporator apparatus...”).

20 Because the heat exchanger disclosed in Claim 26 is a fixed device, the textile material actually slides (passing) by and against the heat exchanger. Passing is defined as “to go across.” (See The American Heritage Dictionary). Thus, the substrate in the present application actually goes across the heat exchanger.

25 Although a fine distinction, by their very nature as rollers, the cylinders described by the Wedler patent simply do not allow the textile material “to go across” the rollers. Instead, the Wedler patent teaches evaporating a solvent into a solvent vapor by rolling the substrate with remaining chemical mixture with and against an unfixed evaporator apparatus (i.e., rollers). The substrate does not “go across” the rollers, but rolls with the rollers.

30

Therefore, the Wedler patent does not teach each of the claimed elements of Claim 26. Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 26.

5  
Claim 27

Regarding Claim 27, the Examiner stated that the Wedler patent discloses the removal of a portion of chemical mixture can be performed using a squeeze roller. (See FIGs. 1 and 3 and column 4, lines 65-75 (padding rolls 14)).

10  
Claim 27, dependent on Claim 26, is patentable by virtue of its dependency. Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 27.

15  
Claims 28 and 29

Regarding Claims 28 and 29, the Examiner stated the Wedler patent discloses that the evaporator apparatus can be a heat exchanger apparatus that uses steam to heat the heat exchanger. (See FIG. 3 and column 5, lines 5-25 (the cylinders 44 are heated and act to vaporize the solvent and dry the web, and can be heated with steam)).

20  
Claim 28, dependent on Claim 26, is patentable by virtue of its dependency. Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 28.

25  
Additionally, Claim 29, dependent on Claim 26, is patentable by virtue of its dependency. Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 29.

Claim 30

30  
Regarding Claim 30, the Examiner stated that the Wedler patent discloses that the solvent vapor can be prevented from escaping by using a negative pressure. (See FIG. 3

and column 4, lines 60-75). The Examiner also stated that the solvent vapor can be removed. (See column 4, lines 50-55 and column 5, lines 1-5).

Claim 30, dependent on Claim 26, is patentable by virtue of its dependency.

5 Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 30.

### Claim 33

Regarding Claim 33, the Examiner stated that the removed solvent can be  
10 collected. (See column 4, lines 65-75 and figure 3). The Examiner also stated that the solvent removed in the squeezing is collected back in the coating pool. (See FIG. 3). The Examiner further stated that the solvent removed from evaporation can also be collected for recycling for reuse. (See column 4, lines 55-65 and column 5, lines 1-5).

15 Claim 33, dependent on Claim 26, is patentable by virtue of its dependency. Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 33.

*Issue 3 – Is Claim 31 patentable under 35 U.S.C. 103(a) over the Wedler patent as applied to Claims 26-30 and 33, in further view of the Ellison patent?*

20 The Examiner rejected Claim 31 under 35 U.S.C. 103(a) as being unpatentable over the Wedler patent as applied to claims 26-30 and 33 above, and further in view of the Ellison patent. The Examiner stated that the Wedler patent teaches all the features of these claims except the blower. However, the Examiner stated that the Ellison patent teaches that when moving a coated substrate in oven area, it is known to use a fan to  
25 establish a slightly negative pressure to cause an inward gas flow and prevent vapors from escaping. (See column 6, lines 1-45 and column 4, lines 1- 20). The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify a device taught by the Wedler patent to use a blower fan as shown in the Ellison patent. The Examiner stated that such a modification would  
30 be done with an expectation of providing a desirable coated fabric because the Wedler



patent teaches to coat a fabric followed by squeezing to remove excess solvent and then passage into a dryer oven chamber with a negative pressure (vacuum). Additionally, the Examiner stated that the Ellison patent teaches providing fans at an oven entrance as a desirable method to provide a negative pressure. As the negative pressure pulls gases in,  
5 it would prevent vapors from exiting.

Claim 31, dependent on Claim 26, is patentable by virtue of its dependency. Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 31.

10 *Issue 4 – Are Claims 32 and 34-42 patentable under 35 U.S.C. 103(a) over the Wedler patent as applied to Claims 26-30 and 33, in further view of the Kinsley patent?*

The Examiner rejected Claims 32 and 34-42 under 35 U.S.C. 103(a) as being unpatentable over the Wedler patent as applied to claims 26-30 and 33 above, and further in view of the Kinsely patent. The Examiner stated that the Wedler patent teaches all the  
15 features of these claims, except the solvent removing features and re-circulating features. The Examiner further stated that the Wedler patent does teach the padding applicator, as required by Claim 39. (See column 4, lines 65-75). However, the Examiner stated that the Kinsley patent teaches a method for removing non-aqueous solvent from a substrate, where the substrate can be paper or a fabric. (See column 1, lines 10-15 and column 6,  
20 lines 39-45). The Examiner also stated that after a substrate has been coated with a chemical mixture of a coating material and a solvent, the solvent is to be removed. (See column 3, lines 55-65). The Examiner continued, stating that the coated substrate is passed into a chamber which can be at reduced pressure, which would lower a boiling point of the solvent. (See column 7, lines 5-15, column 5, lines 45-65, and column 8,  
25 lines 35-55). The Examiner further stated that the non-aqueous solvent is then evaporated into a solvent vapor. (See column 2, line 60 through column 3, line 10). The Examiner also stated that a steam-based heat exchanger is used to evaporate the solvent (See column 3, lines 55-65). The Examiner further stated that the vapors are prevented from escaping to the extent that a negative pressure is created. (See column 5, lines 45-  
30 65). Additionally, the Examiner stated that the solvent vapors that have been evaporated



into the steam are removed from the system. (See column 5, line 65 through column 6, line 15, and column 7, lines 20-40).

The Examiner also stated that the removed solvent is collected and that the  
5 collecting can include pushing the solvent vapor into a scrubber chamber (the condensing and distillation/decanting). (See column 5, line 65 through column 6, line 15, and column 7, lines 20-40). The Examiner also stated that this would occur via the negative pressure, since such pressure is present. (See column 5, lines 45-65). The Examiner further stated that the vapor is condensed into a condensed liquid solvent solution, which is collected  
10 and then heated to re-vaporize the solvent. The re-vaporized solvent is then cooled and condensed to a re-condensed solvent, which is then collected (the condensing and distillation/decanting). (See column 5, line 65 through column 6, line 15 and column 7, lines 20-40). The Examiner also stated that a water mechanism is used as a condenser apparatus. (See column 7, lines 25-35). The Examiner further stated that the Kinsley  
15 patent teaches that a separator can be present in the process to provide steam which would remove mist, since water is removed, and that the system provides for an easy and efficient removal of solvent. (See column 6, lines 45-60, and column 2, lines 35-65).

The Examiner concluded that it would have been obvious to one of ordinary skill  
20 in the art at the time the invention was made to modify a device taught by the Wedler patent to use a solvent recycling system for re-circulating the collected solvent as shown by the Kinsley patent, with an expectation of providing a desirable coated fabric, because the Wedler patent teaches coating a fabric followed by squeezing the coated fabric to remove excess solvent and heating in a drying oven to remove solvent, with the vapors  
25 recycled for reuse. The Examiner also stated that the Kinsley patent teaches a desirable method of treating recovered solvent to allow for reuse when coating fabric with a solvent-containing material followed by heating in an oven to remove solvent. The Examiner concluded that it would further have been obvious to use a water spray mechanism to condense the solvent vapor as in Claim 35 in the process of the Wedler  
30 patent in view of the Kinsley patent with an expectation of desirable coating results, because the Kinsley patent teaches to condense by adding cold water, which includes

adding the cold water by spraying. The Examiner further concluded that it would further have been obvious to modify a device taught by the Wedler patent in view of the Kinsley patent to use a steam-based heat exchanger to heat the “re-boiler tank” in the processes of distillation/decanting as in Claim 36. The Examiner stated that heat exchanger would be used in expectation of providing desirable heating, because the Kinsley patent teaches distillation/decanting of the recovered solvent vapors and such a process would require heating in a “tank.” The Examiner further stated that the Kinsley patent and the Wedler patent both teach heating with steam, such that steam would be present to provide heating. The Examiner further concluded that it would have further been obvious to modify a device taught by the Wedler patent in view of the Kinsley patent to provide for pumping of the recovered solvent from a recovery tank (which would be provided to hold the recovered solvent) to a mix tank to be provided with the material to be coated and that this mix is further pumped to the application apparatus as in Claims 37-38. The Examiner reasoned that the Kinsley patent provides for solvent recovery, complete with distillation/decanting, which provides a clean solvent that allows for reuse, and it would be obvious to provide for reuse in the coating system itself or an another applicator of the coating system to allow cost savings on solvent.

Claim 32, dependent on Claim 26, is patentable by virtue of its dependency.

Thus, the Applicant respectfully requests that the Board withdraw the Examiner’s rejection of Claim 32.

Claim 34, dependent on Claim 26, is patentable by virtue of its dependency.

Thus, the Applicant respectfully requests that the Board withdraw the Examiner’s rejection of Claim 34.

Claim 35, dependent on Claim 26, is patentable by virtue of its dependency.

Thus, the Applicant respectfully requests that the Board withdraw the Examiner’s rejection of Claim 35.

Claim 36, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 36.

5           Claim 37, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 37.

10           Claim 38, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 38.

15           Claim 39, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 39.

20           Claim 40, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 40.

            Claim 41, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 41.

25           Claim 42, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 42.

30           *Issue 5 – Are Claims 43-48 patentable under 35 U.S.C. 103(a) over the Wedler patent in view of the Kinsley patent as applied to Claims 32 and 34-42, in further view of the Ellison patent?*

The Examiner rejected Claims 43-48 under 35 U.S.C. 103(a) in view of the Wedler patent and the Kinsley patent as applied to Claims 32 and 34-42, and in further view of the Ellison patent. The Examiner stated that the Wedler patent in view of the Kinsley patent teaches all the features of Claims 43-48, except the blower. However, the  
5 Examiner stated that the Ellison patent teaches that when moving a coated substrate in oven area, it is known to use a fan to establish a slightly negative pressure to cause an inward gas flow and prevent vapors from escaping. (See column 6, lines 1-45 and column 4, lines 1-20). The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device taught  
10 by the Wedler patent in view of the Kinsley patent to use a blower fan as shown by the Ellison patent. The Examiner further stated that such a modification would occur with an expectation of providing a desirable coated fabric, because the Wedler patent in view of the Kinsley patent teaches to coat a fabric followed by squeezing to remove excess solvent and then passing the fabric into an oven with a negative pressure (vacuum), and  
15 the Ellison patent teaches that providing fans at an oven entrance is a desirable method to provide a negative pressure. As the negative pressure pulls gases in, it would prevent vapors from exiting.

Claim 43, dependent on Claim 26, is patentable by virtue of its dependency.  
20 Thus, the Applicant respectfully requests that the Board withdraw the Examiner's rejection of Claim 43.

Claim 44, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's  
25 rejection of Claim 44.

Claim 45, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's  
rejection of Claim 45.

30

Claim 46, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's  
rejection of Claim 46.

5           Claim 47, dependent on Claim 26, is patentable by virtue of its dependency.  
Thus, the Applicant respectfully requests that the Board withdraw the Examiner's  
rejection of Claim 47.

          Claim 48, dependent on Claim 26, is patentable by virtue of its dependency.  
10   Thus, the Applicant respectfully requests that the Board withdraw the Examiner's  
rejection of Claim 48.

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### CONCLUSION

For the extensive reasons advanced above, the Appellant respectfully contends that each claim is patentable. Therefore, withdrawal of all rejections is courteously solicited.

5

To the extent necessary, a petition for an extension of time under 37 CFR 1.136 is hereby made. Please charge any shortage of fees due in connection with the filing of this paper, including extension of time fees, to deposit account no. 50-2691 and please credit any excess fees to such deposit account.

10

Respectfully submitted,

15

11 / 2 / 2004

Date

  
Cary Tope-McKay  
Registration No. 41,350

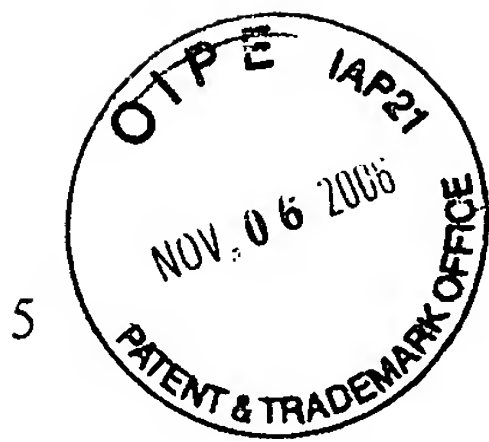
20

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25

Encl:  
Claims Appendix  
Evidence Appendix  
30 Related Proceeding Appendix





## CLAIMS APPENDIX

1. (Withdrawn) A machine comprising:

an application chamber portion containing an application apparatus, the application apparatus is adapted to introduce a chemical mixture into contact with a substrate, wherein the chemical mixture comprises a non-aqueous solvent and a chemical solute, and wherein the substrate with the chemical mixture forms a wet substrate; and

a removal portion connected with the application portion wherein the non-aqueous solvent is removed from the wet substrate, leaving a substrate with remaining chemical solution.

2. (Withdrawn) A machine as set forth in claim 1, wherein the application apparatus is selected from a group consisting of a foam applicator, spray applicator, and a padding applicator.

3. (Withdrawn) A machine as set forth in claim 1, wherein:

the removal portion comprises a removal apparatus for removing a portion of the chemical mixture from the wet substrate, leaving a substrate with remaining chemical mixture;

a vacuum chamber in fluid communication with the removal apparatus for lowering a boiling point of the non-aqueous solvent in the substrate with remaining chemical mixture; and

an evaporator apparatus connected with the vacuum chamber to evaporate the non-aqueous solvent into a solvent vapor.

4. (Withdrawn) A machine as set forth in claim 3, wherein the removal apparatus is a squeeze roller.

5. (Withdrawn) A machine as set forth in claim 3, wherein the evaporator apparatus is a heat exchanger.

5

6. (Withdrawn) A machine as set forth in claim 5, wherein the heat exchanger is a steam-based heat exchanger.

7. (Withdrawn) A machine as set forth in claim 3, further comprising:

10

a blower apparatus in fluid communication with the machine, creating a negative pressure and thereby preventing vapors from escaping; and

a separator connected with the blower apparatus to remove remaining solvent vapors.

15

8. (Withdrawn) A machine as set forth in claim 7, wherein the blower apparatus comprises an item selected from a group consisting of a fan, and a blower.

9. (Withdrawn) A machine as set forth in claim 7, wherein the separator comprises a mist eliminator and a high efficiency separator, further removing solvent vapors.

20

10. (Withdrawn) A machine as set forth in claim 7, further comprising a collector portion for collecting removed non-aqueous solvent.

11. (Withdrawn) A machine as set forth in claim 10, wherein:

25

the collector portion comprises a vapor scrubber chamber, where solvent vapor is pushed into the vapor scrubber chamber via the negative pressure;

a condensing apparatus associated with the vapor scrubber chamber, condensing the solvent vapor into a condensed liquid solvent solution;

30

a re-boiler tank in fluid communication with the vapor scrubber chamber and the removal apparatus, the re-boiler tank collecting the condensed liquid solvent solution and the portion of the chemical mixture into a collected solution, where the collected solution is heated to vaporize the non-aqueous solvent into a re-vaporized non-aqueous solvent;

5                   a cooling chamber connected with the re-boiler tank, where the re-  
vaporized non-aqueous solvent is condensed into a re-condensed non-aqueous  
solvent; and

                  a recovery tank associated with the cooling chamber to collect the re-  
condensed non-aqueous solvent.

10

12. (Withdrawn) A machine as set forth in claim 11, wherein the condensing  
apparatus is a water spray mechanism.

15

13. (Withdrawn) A machine as set forth in claim 11, wherein the re-boiler tank  
further comprises a steam-based heat exchanger.

20

14. (Withdrawn) A machine as set forth in claim 11, further comprising a mix tank,  
wherein the re-condensed non-aqueous solvent is pumped from the recovery tank  
to the mix tank, where it is combined with appropriate chemicals to create the  
chemical mixture.

25

15. (Withdrawn) A machine as set forth in claim 12, wherein the application  
apparatus is selected from a group consisting of a foam applicator, spray  
applicator, and a padding applicator.

30

16. (Withdrawn) A machine as set forth in claim 15, wherein the removal apparatus  
is a squeeze roller.

17. (Withdrawn) A machine as set forth in claim 16, wherein the evaporator  
apparatus is a heat exchanger.

18. (Withdrawn) A machine as set forth in claim 17, wherein the heat exchanger is a  
steam-based heat exchanger.

- 5 19. (Withdrawn) A machine as set forth in claim 18, wherein the blower apparatus comprises an item selected from a group consisting of a fan, and a blower.
- 10 20. (Withdrawn) A machine as set forth in claim 19, wherein the separator comprises a mist eliminator and a high efficiency separator, further removing solvent vapors.
21. (Withdrawn) A machine as set forth in claim 20, wherein the re-boiler tank further comprises a steam-based heat exchanger.
- 15 22. (Withdrawn) A machine as set forth in claim 21, further comprising a mix tank, wherein the re-condensed non-aqueous solvent is pumped from the recovery tank to the mix tank, where it is combined with appropriate chemicals to create the chemical mixture.
- 20 23. (Withdrawn) A machine as set forth in claim 22, further comprising an additional application apparatus, where the chemical mixture is applied to an additional side of the substrate.
24. (Cancelled).
- 25 25. (Cancelled)
26. (Previously Amended) A method for applying a chemical solution to a substrate, comprising acts of:
- 30 forming a chemical mixture comprising a non-aqueous solvent and a chemical solute;
- applying the chemical mixture to the substrate forming a wet substrate;
- removing the non-aqueous solvent from the wet substrate, leaving the a substrate with remaining chemical solute;

5                    wherein the act of removing the non-aqueous solvent from the wet  
substrate comprises acts of:

                  removing a portion of the chemical mixture from the wet substrate,  
leaving a substrate with remaining chemical mixture;

                  lowering a boiling point of the non-aqueous solvent in the substrate  
10                with remaining chemical mixture; and

                  evaporating the non-aqueous solvent into a solvent vapor by  
passing the substrate with remaining chemical mixture by and against an  
evaporator apparatus, such that the evaporator apparatus operates as a heat  
plate to evaporate the non-aqueous solvent into a solvent vapor.

15  
27. (Previously Amended)            A method of claim 26, wherein the act of removing  
a portion of the chemical mixture further comprises an act of using a squeeze  
roller as a removal apparatus for removing a portion of the chemical mixture from  
the wet substrate.

20  
28. (Previously Amended)            A method of claim 26, wherein the act of  
evaporating the non-aqueous solvent into a solvent vapor-, further comprises an  
act of utilizing a heat exchanger as the evaporator apparatus for evaporating the  
non-aqueous solvent.

25  
29. (Original) A method of claim 28, further comprising an act of using a steam-  
based heat exchanger as the heat exchanger.

30  
30. (Previously Amended)            A method of claim 26, further comprising acts of:  
                  preventing solvent vapor from escaping by creating a negative pressure;  
and  
                  removing the solvent vapor.

- 5 31. (Previously Amended) A method of claim 30, wherein the act of preventing solvent vapor from escaping further comprises acts of utilizing a blower apparatus to create a negative pressure and prevent the vapor from escaping.
- 10 32. (Previously Amended) A method of claim 30, wherein the act of removing solvent vapors further comprises an act of utilizing a separator for removing the solvent vapors, the separator comprising a mist eliminator and a high-efficiency separator.
- 15 33. (Previously Amended) A method of claim 30, further comprising an act of collecting any removed non-aqueous solvent, the removed non-aqueous solvent being a combination of removed solvent vapors and solvent in the chemical mixture that was removed in the act of removing a portion of the chemical mixture from the wet substrate.
- 20 34. (Previously Amended) A method of claim 33, wherein the act of collecting any removed non-aqueous solvent comprises acts of:
- pushing the solvent vapor into a vapor scrubber chamber via the negative pressure;
  - condensing the solvent vapor into a condensed liquid solvent solution;

25 collecting the condensed liquid solvent solution and the portion of the chemical mixture into a collected solution;

  - heating the collected solution to vaporize the non-aqueous solvent into a re-vaporized non-aqueous solvent;
  - cooling and condensing the re-vaporized non-aqueous solvent into a re-

30 condensed non-aqueous solvent; and

  - collecting the re-condensed non-aqueous solvent in a recovery tank.
35. (Previously Amended) A method of claim 34, wherein the act of condensing the solvent vapor into a condensed liquid solvent solution further



- 5 comprises an act of using a water spray mechanism as a condensing apparatus for  
condensing the solvent vapor.
36. (Previously Amended) A method of claim 34, wherein the act of heating  
the collected solution to vaporize the non-aqueous solvent into a re-vaporized  
10 non-aqueous solvent further comprises an act of using a steam-based heat  
exchanger as a re-boiler tank for heating the collected solution.
37. (Original) A method of claim 34, further comprising an act of pumping the re-  
condensed non-aqueous solvent from the recovery tank to a mix tank, where it  
15 may be combined with appropriate chemicals to create the chemical mixture.
38. (Original) A method of claim 37, further comprising an act of pumping the  
chemical mixture to the application apparatus.
- 20 39. (Previously Amended) A method of claim 35, wherein the act of applying the  
chemical mixture with the substrate further comprises acts of selecting an  
application apparatus; and utilizing the application apparatus for applying the  
chemical mixture with the substrate, where the application apparatus is selected  
25 from a group consisting of a foam applicator, spray applicator, and a padding  
applicator.
40. (Previously Amended) A method of claim 39, wherein the act of removing a  
portion of the chemical mixture further comprises an act of using a squeeze roller  
as a removal apparatus for removing a portion of the chemical mixture from the  
30 wet substrate.
41. (Previously Amended) A method of claim 40, wherein the act of evaporating the  
non-aqueous solvent into a solvent vapor-, further comprises an act of utilizing a  
heat exchanger as an evaporator apparatus for evaporating the non-aqueous  
35 solvent.

42. (Original) A method of claim 41, further comprising an act of using a steam-based heat exchanger as the heat exchanger.

43. (Previously Amended) A method of claim 42, wherein the act of preventing solvent vapor from escaping further comprises acts of utilizing a blower apparatus to create a negative pressure and prevent the vapor from escaping.

44. (Previously Amended) A method of claim 43, wherein the act of removing solvent vapors further comprises an act of utilizing a separator for removing the solvent vapors, the separator comprising a mist eliminator and a high-efficiency separator.

45. (Previously Amended) A method of claim 44, wherein the act of heating the collected solution to vaporize the non-aqueous solvent into a re-vaporized non-aqueous solvent further comprises an act of using a steam-based heat exchanger as a re-boiler tank for heating the collected solution.

46. (Original) A method of claim 45, further comprising an act of pumping the re-condensed non-aqueous solvent from the recovery tank to a mix tank, where it may be combined with appropriate chemicals to create the chemical mixture.

47. (Original) A method of claim 46, further comprising an act of pumping the chemical mixture to the application apparatus.

48. (Original) A method of claim 47, further comprising an act of pumping the chemical mixture to an additional application apparatus, where the chemical mixture is applied to an additional side of the substrate.

49. (Withdrawn) A machine for applying a chemical solution to a substrate, comprising:

5                   a means for forming a chemical mixture comprising a non-aqueous  
solvent and a chemical solute;  
                  a means for applying the chemical mixture with the substrate, forming a  
wet substrate; and  
                  a means for removing the non-aqueous solvent from the wet substrate,  
10               leaving substrate with remaining chemical solution.

50. (Withdrawn) A machine as set forth in claim 49, wherein the means for applying  
the chemical mixture with the substrate, forming a wet substrate, is selected from  
a group consisting of a foam applicator, spray applicator, and a padding  
15               applicator.

51. (Withdrawn) A machine as set forth in claim 49, wherein the means for  
removing the non-aqueous solvent from the wet substrate comprises:  
                  a means for removing a portion of the chemical mixture from the wet  
20               substrate, leaving a substrate with remaining chemical mixture;  
                  a means for lowering a boiling point of the non-aqueous solvent in the  
substrate with remaining chemical mixture; and  
                  a means for evaporating the non-aqueous solvent into a solvent vapor.

25               52. (Withdrawn) A machine as set forth in claim 51, wherein the means for  
removing a portion of the chemical mixture from the wet substrate, is a squeeze  
roller.

53. (Withdrawn) A machine as set forth in claim 51, wherein the means for  
30               evaporating the non-aqueous solvent into a solvent vapor is a heat exchanger.

54. (Withdrawn) A machine as set forth in claim 53, wherein the heat exchanger is a  
steam-based heat exchanger.

35               55. (Withdrawn) A machine as set forth in claim 51, further comprising:

5                   a means for preventing vapors from escaping by creating a negative  
pressure; and  
a means for removing remaining solvent vapors.

10           56. (Withdrawn) A machine as set forth in claim 55, wherein the means for  
preventing vapors from escaping by creating a negative pressure, is selected from  
a group consisting of a fan, and a blower.

15           57. (Withdrawn) A machine as set forth in claim 55, wherein the means for  
removing remaining solvent vapors, is a separator comprising a mist eliminator  
and a high efficiency separator.

58. (Withdrawn) A machine as set forth in claim 55, further comprising a means for  
collecting any removed non-aqueous solvent.

20           59. (Withdrawn) A machine as set forth in claim 58, wherein the means for  
collecting any removed non-aqueous solvent comprises:  
a means for pushing the solvent vapor into a vapor scrubber chamber via a  
negative pressure;  
a means for condensing the solvent vapor into a condensed liquid solvent  
25           solution;  
a means for collecting the condensed liquid solvent solution and the  
portion of the chemical mixture into a collected solution;  
a means for heating the collected solution to vaporize the non-aqueous  
solvent into a re-vaporized non-aqueous solvent;  
30           a means for cooling and condensing the re-vaporized non-aqueous solvent  
into a re-condensed non-aqueous solvent; and  
a means for collecting the re-condensed non-aqueous solvent.

- 5 60. (Withdrawn) A machine as set forth in claim 59, wherein the means for  
condensing the solvent vapor into a condensed liquid solvent solution, is a water  
spray mechanism.
- 10 61. (Withdrawn) A machine as set forth in claim 59, wherein the means for heating  
the collected solution to vaporize the non-aqueous solvent into a re-vaporized  
non-aqueous solvent, is a steam-based heat exchanger.
- 15 62. (Withdrawn) A machine as set forth in claim 59, further comprising a means for  
pumping the re-condensed non-aqueous solvent from a recovery tank to a mix  
tank, where it may be combined with appropriate chemicals to create the chemical  
mixture.
- 20 63. (Withdrawn) A machine as set forth in claim 62, further comprising a means for  
pumping the chemical mixture to the application apparatus.
- 25 64. (Withdrawn) A machine as set forth in claim 60, wherein the means for applying  
the chemical mixture with the substrate, forming a wet substrate, is at least one  
item selected from a group consisting of a foam applicator, spray applicator, and a  
padding applicator.
- 30 65. (Withdrawn) A machine as set forth in claim 64, wherein the means for  
removing a portion of the chemical mixture from the wet substrate, is a squeeze  
roller.
- 35 66. (Withdrawn) A machine as set forth in claim 65, wherein the means for  
evaporating the non-aqueous solvent into a solvent vapor is a heat exchanger.
67. (Withdrawn) A machine as set forth in claim 66, wherein the heat exchanger is a  
steam-based heat exchanger.

- 5 68. (Withdrawn) A machine as set forth in claim 67, wherein the means for preventing vapors from escaping by creating a negative pressure, is at least one item selected from a group consisting of a fan, and a blower.
- 10 69. (Withdrawn) A machine as set forth in claim 68, wherein the means for removing remaining solvent vapors, is a separator comprising is a mist eliminator and a high efficiency separator.
- 15 70. (Withdrawn) A machine as set forth in claim 69, wherein the means for heating the collected solution to vaporize the non-aqueous solvent into a re-vaporized non-aqueous solvent, is a steam-based heat exchanger taking the form of a re-boiler tank.
- 20 71. (Withdrawn) A machine as set forth in claim 70, further comprising a means for pumping the re-condensed non-aqueous solvent from the recovery tank to a mix tank, where it may be combined with appropriate chemicals to create the chemical mixture.
- 25 72. (Withdrawn) A machine as set forth in claim 71, further comprising a means for pumping the chemical mixture to the application apparatus.
73. (Withdrawn) A machine as set forth in claim 72, further comprising a means for pumping the chemical mixture to an additional application apparatus.
- 30 74. (Withdrawn) A machine as set forth in claim 73, further comprising a means for applying the chemical mixture to an additional side of the substrate.





## EVIDENCE APPENDIX

Two definitions were provided in the Appeal Brief. The definitions were taken from [www.dictionary.com](http://www.dictionary.com), which cited the source of the definitions as "The American Heritage Dictionary of English Language," Fourth Edition. In addition to being provided below, print-outs of the actual web pages are provided following this Evidence Appendix. Should the Examiner need further information, the Examiner is encouraged to contact the Applicant's representative.

The definitions are as follows:

### **Heat Exchanger:**

*n.*

A device, such as an automobile radiator, used to transfer heat from a fluid on one side of a barrier to a fluid on the other side without bringing the fluids into direct contact.

*Source: The American Heritage® Dictionary of the English Language, Fourth Edition  
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With: (PLEASE NOTE DEFINITION NUMBER 12)

*prep.*

1. In the company of; accompanying: *Did you go with her?*
2. Next to; alongside of: *stood with the rabbi; sat with the family.*
3.
  - a. Having as a possession, attribute, or characteristic: *arrived with bad news; a man with a moustache.*
  - b. Used as a function word to indicate accompanying detail or condition: *just sat there with his mouth open.*
4.
  - a. In a manner characterized by: *performed with skill; spoke with enthusiasm.*
  - b. In the performance, use, or operation of: *had trouble with the car.*
5. In the charge or keeping of: *left the cat with the neighbors.*
6. In the opinion or estimation of: *if it's all right with you.*
7.
  - a. In support of; on the side of: *I'm with anyone who wants to help the homeless.*
  - b. Of the same opinion or belief as: *He is with us on that issue.*
8. In the same group or mixture as; among: *planted onions with the carrots.*
9. In the membership or employment of: *plays with a jazz band; is with a publishing company.*
10.
  - a. By the means or agency of: *eat with a fork; made us laugh with his jokes.*
  - b. By the presence or use of: *a pillow stuffed with feathers; balloons filled with helium.*
11. In spite of: *With all her experience, she could not get a job.*
12. **In the same direction as:** *sail with the wind; flow with the river.*
13. At the same time as: *gets up with the birds.*
14.
  - a. In regard to: *We are pleased with her decision. They are disgusted with the status quo.*
  - b. Used as a function word to indicate a party to an action, communicative activity, or informal agreement or settlement: *played with the dog; had a talk with the class; lives with an aunt.*
15. In comparison or contrast to: *a car identical with the one her sister just bought.*
16. Having received: *With her permission, he left. I escaped with just a few bruises.*
17.
  - a. And; plus: *My books, with my brother's, make a sizable library. We had turkey with all the trimmings.*
  - b. Inclusive of; including: *comes to \$29.95 with postage and handling.*
18. In opposition to; against: *wrestling with an opponent.*
19. As a result or consequence of: *trembling with fear; sick with the flu.*
20. So as to be touching or joined to: *coupled the first car with the second; linked*

*arms with their partners.*

21. So as to be free of or separated from: *parted with her husband.*
22. In the course of: *We grow older with the hours.*
23. In proportion to: *wines that improve with age.*
24. In relationship to: *at ease with my peers.*
25. As well as; in favorable comparison to: *She could sing with the best of them.*
26. According to the experience or practice of: *With me, it is a question of priorities.*
27. Used as a function word to indicate close association: *With the advent of the rockets, the Space Age began.*

**Idioms:**

***in with* Informal**

In league or association with: *He is in with the wrong crowd.*

***with it* Informal**

1. Interested in and sensitive to the latest styles and trends; up-to-date.
2. Streetwise and knowing; savvy.
3. Mentally competent.

---

[Middle English, *with*, *against*, *from*, from Old English. See *wi-* in Indo-European Roots.]

**Usage Note:** When the subject of a sentence is followed by a noun or noun phrase introduced by *with* rather than *and*, the verb remains singular: *The governor, with his aides, is expected to attend the fair.* See Usage Note at and.

**Source:** *The American Heritage® Dictionary of the English Language, Fourth Edition*  
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## heat exchanger

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a device for transferring the heat of one substance to another, as from the exhaust gases to the incoming air in a regenerative furnace.

[Origin: 1900-05]

*Dictionary.com Unabridged (v 1.0.1)**Based on the Random House Unabridged Dictionary, © Random House, Inc. 2006.**American Heritage Dictionary - Cite This Source***heat exchanger***n.*

A device, such as an automobile radiator, used to transfer heat from a fluid on one side of a barrier to a fluid on the other side without bringing the fluids into direct contact.

*(Download Now or Buy the Book)**The American Heritage® Dictionary of the English Language, Fourth Edition**Copyright © 2000 by Houghton Mifflin Company.**Published by Houghton Mifflin Company. All rights reserved.**Merriam-Webster's Medical Dictionary - Cite This Source*Main Entry: **heat ex·chang·er**

Pronunciation: -iks-"chAnj-&amp;r

Function: *noun*

: a device (as in an apparatus for extracorporeal blood circulation) for transferring heat from one fluid to another without allowing them to mix

*Merriam-Webster's Medical Dictionary, © 2002 Merriam-Webster, Inc.**WordNet - Cite This Source***heat exchanger**

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n : device that transfers heat from one liquid to another without allowing them to mix

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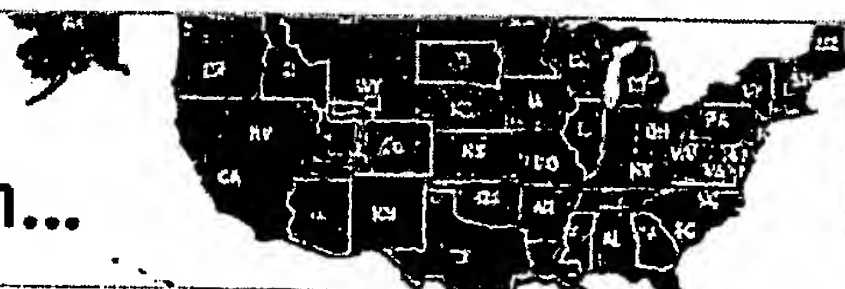


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-preposition

1. accompanied by; accompanying: *I will go with you. He fought with his brother against the enemy.*
2. in some particular relation to (esp. implying interaction, company, association, conjunction, or connection): *I dealt with the problem. She agreed with me.*
3. characterized by or having: *a person with initiative.*
4. (of means or instrument) by the use of; using: *to line a coat with silk; to cut with a knife.*
5. (of manner) using or showing: *to work with diligence.*
6. in correspondence, comparison, or proportion to: *Their power increased with their number. How does their plan compare with ours?*
7. in regard to: *to be pleased with a gift.*
8. (of cause) owing to: *to die with pneumonia; to pale with fear.*
9. in the region, sphere, or view of: *It is day with us while it is night with the Chinese.*
10. (of separation) from: *to part with a thing.*
11. against, as in opposition or competition: *He fought with his brother over the inheritance.*
12. in the keeping or service of: *to leave something with a friend.*
13. in affecting the judgment, estimation, or consideration of: *Her argument carried a lot of weight with the trustees.*
14. at the same time as or immediately after; upon: *And with that last remark, she turned and left.*
15. of the same opinion or conviction as: *Are you with me or against me?*
16. in proximity to or in the same household as: *He lives with his parents.*
17. (used as a function word to specify an additional circumstance or condition): *We climbed the hill with Jeff following behind.*

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## —Idioms

18. in with. IN (def. 34).
19. with child, pregnant.
20. with it, *Slang*.
  - a. knowledgeable about, sympathetic to, or partaking of the most up-to-date trends, fashions, art, etc.
  - b. representing or characterized by the most up-to-date trends, fashions, art, etc.
21. with that. THAT (def. 18).



[Origin: bef. 900; ME, OE: opposite, against (c. ON *vith*), appar. short var. of OE *wither* against; c. OS *withar*, OHG *widar*, ON *vithr*, Goth *withra*]

—Synonyms 4. See BY.

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with (wɪth, wɪθ) Pronunciation Key  

*prep.*

1. In the company of; accompanying: *Did you go with her?*
2. Next to; alongside of: *stood with the rabbi; sat with the family.*
3.
  - a. Having as a possession, attribute, or characteristic: *arrived with bad news; a man with a moustache.*
  - b. Used as a function word to indicate accompanying detail or condition: *just sat there with his mouth open.*
4.
  - a. In a manner characterized by: *performed with skill; spoke with enthusiasm.*
  - b. In the performance, use, or operation of: *had trouble with the car.*
5. In the charge or keeping of: *left the cat with the neighbors.*
6. In the opinion or estimation of: *if it's all right with you.*
7.
  - a. In support of; on the side of: *I'm with anyone who wants to help the homeless.*
  - b. Of the same opinion or belief as: *He is with us on that issue.*
8. In the same group or mixture as; among: *planted onions with the carrots.*
9. In the membership or employment of: *plays with a jazz band; is with a publishing company.*
10.
  - a. By the means or agency of: *eat with a fork; made us laugh with his jokes.*
  - b. By the presence or use of: *a pillow stuffed with feathers; balloons filled with helium.*
11. In spite of: *With all her experience, she could not get a job.*
12. In the same direction as: *sail with the wind; flow with the river.*
13. At the same time as: *gets up with the birds.*
14.
  - a. In regard to: *We are pleased with her decision. They are disgusted with the status quo.*
  - b. Used as a function word to indicate a party to an action, communicative activity, or informal agreement or settlement: *played with the dog; had a talk with the class; lives with an aunt.*
15. In comparison or contrast to: *a car identical with the one her sister just bought.*
16. Having received: *With her permission, he left. I escaped with just a few bruises.*
- 17.

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*turkey with all the trimmings.*

b. Inclusive of; including: *comes to \$29.95 with postage and handling.*

18. In opposition to; against: *wrestling with an opponent.*
19. As a result or consequence of: *trembling with fear; sick with the flu.*
20. So as to be touching or joined to: *coupled the first car with the second; linked arms with their partners.*
21. So as to be free of or separated from: *parted with her husband.*
22. In the course of: *We grow older with the hours.*
23. In proportion to: *wines that improve with age.*
24. In relationship to: *at ease with my peers.*
25. As well as; in favorable comparison to: *She could sing with the best of them.*
26. According to the experience or practice of: *With me, it is a question of priorities.*
27. Used as a function word to indicate close association: *With the advent of the rockets, the Space Age began.*

#### **Idioms:**

***in with Informa.***

In league or association with: *He is in with the wrong crowd.*

***with it Informa.***

1. Interested in and sensitive to the latest styles and trends; up-to-date.
2. Streetwise and knowing; savvy.
3. Mentally competent.

[Middle English, *with*, *against*, *from*, from Old English. See *wi-* in Indo-European Roots.]

**Usage Note:** When the subject of a sentence is followed by a noun or noun phrase introduced by *with* rather than *and*, the verb remains singular: *The governor, with his aides, is expected to attend the fair.* See Usage Note at [and](#).

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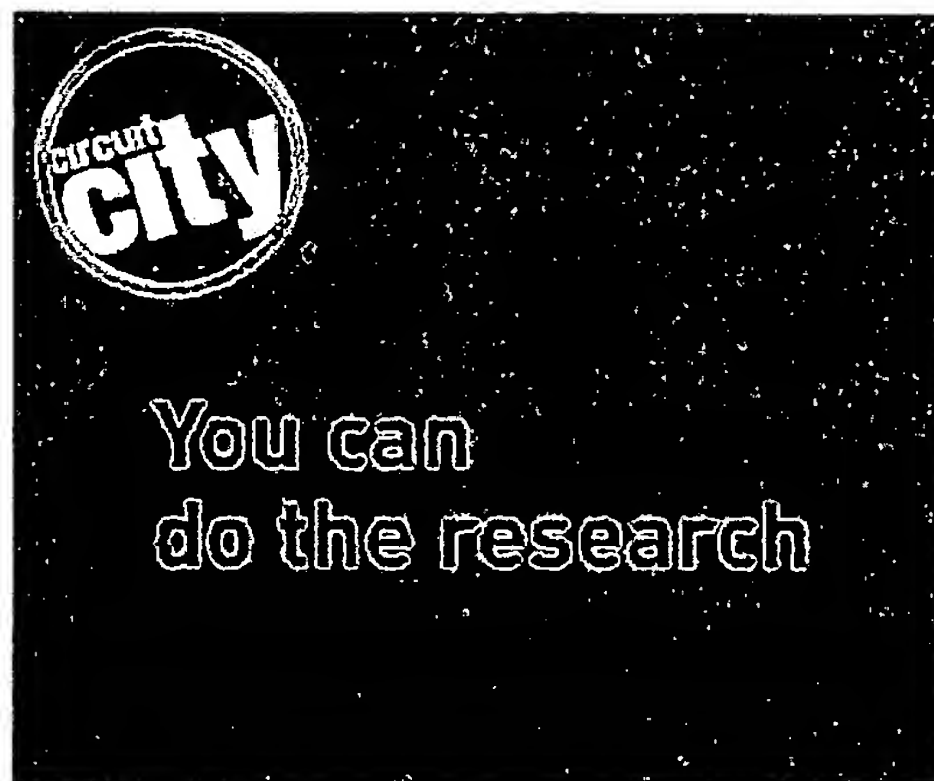
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to live with; level with; lie with; like a chicken with its head cut off; over and done with; over with; pal around with; part with; play ball (with); play the devil with; play with fire; put up with; reckon with; roll with the punches; rub elbows with; run around (with); run away with; run off with; run with; saddle someone with; see with half an eye; settle with; shake hands with; shake with laughter; side with; sign on with; sit well with; sleep with; spar with; square with; stand up with; stay with; stick with; stuck with; swim with the tide; take issue with; taken with; take the bitter with the sweet; take the rough with the smooth; take up with; tamper with; tarred with the same brush; tax with; team up with; tinker with; together with; to hell with; top off (with); to start with; toy with; trouble one's head with; vote with one's feet; walk off with; what's with; what with; you can't take it with you.

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